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TO: THE UNITED STATES PATENT AND TRADEMARK OFFICE  
FAX: (703) 872-9306

FROM: MARK ALLEN.

PAGES: 9

RE: Response to Office Action

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Applicant:	Mark R. Allen	)	Art Unit:	2838
Serial No.:	10/607,265	)	Examiner:	Nguyen, Matthew
Filed:	6/27/2003	)	Docket No.	ALL-01
Title:	FET Current Regulation of LEDs	)	Conf. No.	4752
		)		

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This cover sheet (1pg)  
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Certificate of Transmission under 37 CFR 1.8

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Mark R. AllenPrinted Name: Mark Allen

APR 08 2005

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Title:	FET Current Regulation	)	
	of LEDs	)	Conf. No. 4752
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Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

RESPONSE

Dear Sir:

This communication is responsive to an Office Action mailed December 10, 2004. Timely response is therefore made up to and including March 10, 2005. No fee is believed to be due. Applicant respectfully submits the following amendments and remarks for consideration by the Examiners.

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Mark R. Allen  
Printed Name: Mark Allen

## AMENDMENTS TO THE CLAIMS

1. (currently amended) A system for current regulation of a light emitting diode, said system comprising:

a voltage source,

a light emitting diode electrically connected to said voltage source for supplying light to an area,

at least one field effect transistor electrically connected to said voltage source and supplying a constant output current to said light emitting diode,

wherein said field effect transistor is a voltage driven component having ~~an~~ the constant output current governed by a junction voltage of said field effect transistor.

2. (original) The system for current regulation of a light emitting diode according to claim 1, wherein said junction voltage is made constant by connecting a gate and a source of said field effect transistor together.

3. (original) The system for current regulation of a light emitting diode according to claim 1, wherein a resistor is electrically connected between said gate and said source to create a predetermined nonzero gate-source voltage.

4. (original) The system for current regulation of a light emitting diode according to claim 1, wherein said gate and said source are electrically connected to create a substantially zero gate-source voltage.

5. (original) The system for current regulation of a light emitting diode according to claim 1, wherein a current supplied to said light emitting diode is limited by a maximum output current value defined the output voltage of the field effect transistor set by a gate-source voltage.

6. (original) The system for current regulation of a light emitting diode according to claim 1, wherein said field effect transistor allows current to pass as long as said current is no greater than a maximum output current value defined the output voltage of the field effect transistor set by a gate-source voltage.

7. (original) The system for current regulation of a light emitting diode according to claim 1, wherein an average current delivered to said light emitting diode is proportional to a maximum output current value defined the output voltage of the field effect transistor set by a gate-source voltage.

8. (original) The system for current regulation of a light emitting diode according to claim 1, wherein said field effect transistor is disposed upstream of said light emitting diode.

9. (original) The system for current regulation of a light emitting diode according to claim 1, wherein said field effect transistor is disposed downstream of said light emitting diode.

10. (original) The system for current regulation of a light emitting diode according to claim 1, wherein an optional resistor may be electrically connected between said gate and said source.

11. (original) The system for current regulation of a light emitting diode according to claim 1, wherein at least two field effect transistors are electrically connected to said voltage source and said light emitting diode.

### REMARKS

Claims 1-11 are pending in the application. Herein, applicant amends claim 1, with claims 2-11 remaining as originally filed.

In paragraph 1 of the office action, the Examiner invites the applicant to carefully review the specification for minor errors. The applicant respectfully requests that minor amendments to the specification, if needed, be done after the examiner has indicated the claims have allowable subject matter.

#### Response to §102 Rejection

In paragraph 2 of the office action, the Examiner rejects claims 1-3, 5-7, 9, and 10 under 35 U.S.C. §102(b), as being anticipated by U.S. patent no. 5,459,478 (Bolger). In response, the applicant amends independent claim 1 to expressly state the field effect transistor is "supplying a constant output current to said light emitting diode." Figure 8 of the application (duplicated below), is useful to illustrate an example of the system for current regulation of claim 1.

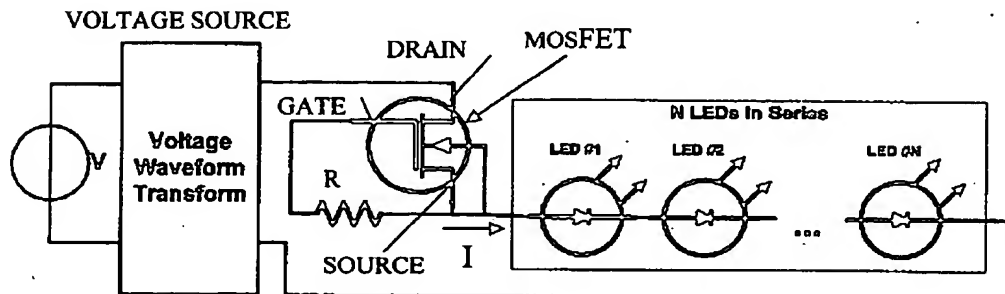


Figure 8 from Specification, with added annotations

As shown in Figure 8, the system has a voltage source electrically connected to one or more LED's. An FET (shown as a MOSFET device), electrically connects to the voltage source. The FET is arranged so that an electrical path is established from the SOURCE, through the LEDs, and back to the DRAIN. More particularly, the SOURCE supplies an output current "I" into the LED or the set of series LEDs. This output current I is kept constant according to the junction voltage between the GATE and the SOURCE. A resistor R is sized to set the junction voltage, and the level of the constant current. As more fully described in the following excerpts from paragraphs 0028 and 0029 of the application:

In this Active region, the FET serves as a current source to a series load, since the output current  $I_D$  is determined solely by the FET internal junction voltage  $V_{GS}$ .

The effect of the FET current regulator is to clamp the current to the maximum value of  $I_D$  set by the Gate-Source voltage  $V_{GS}$ . The value of  $V_{GS}$  is fixed by the FET device properties and the regulating resistor which, in turn, may be a simple wire or zero resistance.

In contrast, Bolger does not have an FET that operates to supply a constant current as recited in claim 1. Instead, the FET of Bolger operates as a mere switch, as described in the following excerpts from column 4 of Bolger:



Response to §103 Rejection

In paragraph 3 of the office action, the Examiner rejects claims 4 and 11 under 35 U.S.C. §103(a), as being unpatentable over U.S. patent no. 5,459,478 (Bolger) in view of U.S. patent no. 6,748,180 (Feng). As described more fully above with reference to claim 1, Bolger fails to disclose all the limitations of dependent claims 4 and 11. Feng does not overcome the deficiencies of Bolger, as Feng also fails to disclose any FET that supplies a constant output current to a light emitting diode. Instead, Feng uses a capacitor to regulate LED driving current. As stated in the Abstract of Feng:

A high efficiency light emitting diode (LED) driver circuit utilizes a capacitor to regulate the LED driving current. The voltage across the capacitor is monitored to maintain a preselected low threshold voltage on the capacitor, which determines the LED optical emission intensity. The capacitor provides the LED driver current by discharging through the LED during transmission intervals, and the power supply for the device is used only to maintain the capacitor charge level.

As described above, Bolger and Feng, either alone or in combination, fail to disclose any FET that supplies a constant output current to a light emitting diode, as recited in claims 4 and 11. Since Bolger and Feng fail to disclose all the limitations of claims 4 and 11, the applicant respectfully submits that a prima facie case of obviousness has not been made. Accordingly, claims 4 and 11 are not rendered obvious in view of Bolger and Feng.



In paragraph 4 of the office action, the Examiner rejects claim 8 under 35 U.S.C. §103(a), as being unpatentable over U.S. patent no. 5,459,478 (Bolger). As described more fully above with reference to claim 1, Bolger fails to disclose all the limitations of dependent claim 8. More particularly, Bolger fails to disclose any FET that supplies a constant output current to a light emitting diode, as recited in claim 8. Since Bolger fails to disclose all the limitations of claim 8, the applicant respectfully submits that a prima facie case of obviousness has not been made. Accordingly, claim 8 is not rendered obvious in view of Bolger.

#### Conclusion

The applicant has reviewed the prior art made of record and not relied upon, and believes the pending claims are patentably distinguishable from all cited art. The applicant respectfully submits that pending claims 1 - 11 are now in a condition for allowance. Any questions regarding this application may be directed to the undersigned.

Respectfully submitted,

*Mark R. Allen*

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